



Attentiveness Training (AT)

The Attentiveness Training has been designed to improve concentration and focus, acuity of perception, short term memory, mental processing speed, mood, confidence and performance under pressure.

Attentiveness Training contains monaural beats, binaural beats and isochronic tones at Gamma 40Hz and 80Hz.

Gamma 40Hz and 80Hz train towards a focused, relaxed and resourceful peak performance.

Daily listening to this track in conjunction with Relaxation Training is expected to have the following effect in daily life:

- Improved resilience
- Peak performance with good judgements and decision making under pressure
- Improved mood
- Reduced negative impact of negative stress and anxiety
- Increased attention, focus and vigilance
- Improved memory
- Increased engagement
- Improved emotion regulation
- Increased energy

Attentiveness Training can be listened to in the morning on waking or before challenging tasks that require vigilance and attention.

We recommend alternating the Attentiveness Training with the Relaxation Training, practicing for example the Attentiveness Training in the morning and the Relaxation Training at night. For best and permanent effect, we recommend listening to the 20-minute track 1x-2x daily for a period of 6 weeks, and thereafter less frequently. Do not use the Attentiveness Training more than 2x daily, as it may cause overstimulation or agitation, when used too frequently.

The Training is designed to develop resilience and to reduce the negative impact of stress, anxiety and low mood on health and performance.

It may take between 3 and 5 weeks to see the full potential effect of this training.

Only listen with **headphones or earphones** to this sound file to experience the brain entraining effect of the binaural beats. The head/earphones should be of reasonable quality ideally a flat frequency response between 20Hz and 20.00Hz.

You can monitor the effect during the session (Attentiveness Training) and by tracking the long-term effect of the training with the Autonomic Health Assessment 1x a week at the same time of the day (prior to the training).

The long-term effects of AT can be monitored in the improvement and normalization of all HRV parameters: HR, SDNN, LF, HF, MF/LF and HF/LF, which can be monitored through the Autonomic Health Assessment AHA.



Attentiveness Training (AT)

Attentiveness Training is particularly but not exclusively indicated, when your Autonomic Health Assessment shows one or more of the following characteristics:

Low levels of Low Frequency (HF) power

Low levels of Low Frequency (LF) power

Too high or too low LF/HF ratio

Low SDNN

For explanation please Result Guide

ATTENTIVENESS TRAINING (AT) INSTRUCTIONS

Sit down in a quiet, comfortable space, and avoid distractions or disturbances.

Connect your earbuds or headphones to your device.

Switch on the oximeter.

Open the app and wait until it shows that the oximeter is connected.

Chose "RUN" from the main menu.

Press 'Engagement Training' and the Engagement Training page will appear.

The duration of the training is by default 20 minutes.

At the end of your training, the history page will open and show you the results of your training. You can export the data and track your progress.



Attentiveness Training (AT)

DISCLAIMER

The user of the *Attentiveness Training*, agrees that training program is designed solely for health improvement, performance management, stress reduction, meditation, self-improvement, learning, aid in motivation, relaxation and experimentation. *This application is not intended as a replacement for medical or psychological diagnosis and treatment. No medical or psychological claims are intended, express or implied.*

Those meeting any of the following conditions, whether knowingly or not, should not use this application:

Epileptics
Pregnant women
Those wearing a pacemaker

Those who should consult a qualified physician or therapist before the use of this product include:

Individuals under the influence of medication or drugs
Individuals who have a history of severe mental illness
Individuals who have a history of tinnitus

This training is not to be used while under the influence of alcohol or other mood-altering substances, whether they are legal or illegal.

Finally, DO NOT LISTEN TO THE AUDIO FILE WHILE DRIVING OR OPERATING MACHINERY

The user of the *Attentiveness Training* assumes all risks, waiving any claims against Adaptive Resilience Ltd. or London Integrated Health Ltd. and its affiliates for any and all mental or physical injuries. The user also agrees to assume liabilities when allowing other persons to access the Gamma Theta Training.

In no case will Adaptive Resilience Ltd. or London Integrated Health Ltd. and its affiliates or distributors of the *Attentiveness Training* be liable for chance, accidental, special, direct or indirect damages resulting from use, misuse or defect of its program, instructions or documentation.

The parties shall attempt to resolve all disputes arising out of this agreement in a spirit of cooperation without formal proceedings. Any dispute which cannot be so resolved (other than a request for injunctive relief) shall be subject to arbitration upon written demand of either party. Arbitration shall take place within forty-five days of receipt of the written demand, in London, United Kingdom, or at another location (or in whole or in part by phone or other means) if the parties so agree. The arbitration shall take place before an arbitrator chosen as follows: The parties shall each choose a representative, and the representatives shall choose an arbitrator. The arbitrator shall schedule an informal proceeding, hear the arguments, and decide the matter. Each party shall pay half the costs of the arbitration proceeding. The arbitrator shall not have the authority to award punitive damages or any other form of relief not contemplated in this Agreement. Regarding each issue submitted to arbitration, the decision shall be accompanied by a written explanation of the basis upon which it was arrived. Judgment upon the award, if any, rendered by the arbitrators may be entered in any court having jurisdiction thereof.



Attentiveness Training (AT)

About Gamma Brainwaves

"Gamma is measured between 30 and 44 (Hz) and is the only frequency group found in every part of the brain. When the brain needs to simultaneously process information from different areas, it hypothesized that the 40Hz activity consolidates the required areas for simultaneous processing. A good memory is associated with well-regulated and efficient 40Hz activity, whereas a 40Hz deficiency creates learning disabilities."

"MIT neuroscientists found that neurons in the prefrontal cortex — the brain's planning center — fire in unison and send signals to the visual cortex to do the same, generating high-frequency waves that oscillate between these distant brain regions like a vibrating spring. These waves, also known as gamma oscillations, have long been associated with cognitive states such as attention, learning and consciousness. "We are especially interested in gamma oscillations in the prefrontal cortex because it provides top-down influences over other parts of the brain," explains senior author Robert Desimone, director of the McGovern Institute for Brain Research and the Doris and Don Berkey Professor of Neuroscience at MIT. "We know that the prefrontal cortex is affected in people with schizophrenia, ADHD and many other brain disorders, and that gamma oscillations are also altered in these conditions. Our results suggest that altered neural synchrony in the prefrontal cortex could disrupt communication between this region and other areas of the brain, leading to altered perceptions, thoughts, and emotions.

MIT News May 2009 'Long-distance brain waves focus attention, McGovern study finds' Cathryn M. Delude, McGovernInstitute, May 28, 2009

Gamma brainwaves and voluntary Attention

"Gamma-band response was linked to voluntary shifts of attention, but not to the involuntary capture of attention. The presence of increased gamma responses for the voluntary allocation of attention, and its absence in cases of involuntary capture suggests that the neural mechanisms governing these two types of attention are different."

Different Effects of Voluntary and Involuntary Attention on EEG Activity in the Gamma Band

Ayelet N. Landau, Michael Esterman, Lynn C. Robertson, Shlomo Bentin and William Prinzmetal

Journal of Neuroscience 31 October 2007, 27 (44) 11986-11990; DOI: <https://doi.org/10.1523/JNEUROSCI.3092-07.2007>

"Specifically, we investigated changes in induced alpha, beta, and gamma activity in 6-month-old infants during repeated presentations of either a face or an object, and examined whether these changes predicted behavioral responses to novelty at test. We found that induced gamma activity over occipital scalp regions decreased with stimulus repetition in the face condition but not in the toy condition, and that **greater decreases in the gamma band were associated with enhanced orienting to a novel face at test.**"

Repetition Suppression of Induced Gamma Activity Predicts Enhanced Orienting toward a Novel Stimulus in 6-month-old Infants Kelly A. Snyder and Andreas Keil, Journal of Cognitive Neuroscience, Volume 20 | Issue 12 | December 2008 p.2137-2152



Attentiveness Training (AT)

"We investigated whether evoked and induced 40Hz activity differentiate automatic, bottom-up aspects of attention from voluntary, top-down related attentional demands. An auditory novelty-oddball task was applied to 14 healthy subjects. As predicted, more evoked gamma was found for the target condition than in the two task-irrelevant conditions. Since gamma band activity was not enhanced for novel stimuli, the evoked gamma response cannot be explained with a simple concept of stimulus arousal. Neither induced gamma nor the degree of 40Hz phase-locking were different between the experimental conditions. Taken together, our data emphasize the role of evoked gamma band activity for top-down attentional processing."

Top-down attentional processing enhances auditory evoked gamma band activity

Debener, Stefan; Herrmann, Christoph S.; Kranczioch, Cornelia; Gembris, Danie; Engel, Andreas K.

NeuroReport: April 15th, 2003 - Volume 14 - Issue 5 - p 683-686, Cognitive Neuroscience and Neuropsychology

Gamma Brainwaves and Working Memory

"Working memory is the ability to actively hold information in the mind. Recent results demonstrate that working memory is organized by oscillatory processes in the theta and gamma frequency range."

Working Memory: The Importance of Theta and Gamma Oscillations; Lisman, John, Current Biology, Volume 20, Issue 11, R490 - R492

"Studies of working memory load effects on human EEG power have indicated divergent effects in different frequency bands. Although gamma power typically increases with load, the load dependency of the lower frequency theta and alpha bands is uncertain."

Effects of Working Memory Load on Oscillatory Power in Human Intracranial EEG

Jed A. Meltzer Hitten P. Zaveri Irina I. Goncharova Marcello M. Distasio Xenophon Papademetris Susan S. Spencer Dennis D. Spencer R. Todd Constable

Cerebral Cortex, Volume 18, Issue 8, 1 August 2008, Pages 1843–1855

"Maintenance of an increasing number of items elicited an incrementally negative shift of the DC potential and an increase in MTL gamma-band activity."

Sustained Neural Activity Patterns during Working Memory in the Human Medial Temporal Lobe

Nikolai Axmacher, Florian Mormann, Guillén Fernández, Michael X Cohen, Christian E. Elger and Juergen Fell

Journal of Neuroscience 18 July 2007, 27 (29) 7807-7816

"We analyzed intracranial recordings from two epileptic patients as they performed a working memory task. Spectral analyses revealed that, in both patients, gamma (30–60 Hz) oscillations increased approximately linearly with memory load, tracking closely with memory load over the course of the trial. This constitutes the first evidence that gamma oscillations, widely implicated in perceptual processes, support the maintenance of multiple items in working memory."

Gamma Oscillations Correlate with Working Memory Load in Humans

Marc W. Howard Daniel S. Rizzuto Jeremy B. Caplan Joseph R. Madsen John Lisman Aschenbrenner-Scheibe Andreas Schulze-Bonhage Michael J. Kahana

Cerebral Cortex, Volume 13, Issue 12, 1 December 2003, Pages 1369–1374



Attentiveness Training (AT)

Gamma Brainwaves to Treat Alzheimer's

"The accumulation of amyloid-beta proteins is linked to the development of Alzheimer's disease. The disease is triggered by an imbalance in two different amyloid proteins—which form a plaque found in the brains of Alzheimer's patients. A reduction in the relative level of healthy amyloid-beta 40 compared to 42 is linked to Alzheimer's. Dr. Inna Slutsky of *Tel Aviv University's Sackler Faculty of Medicine* and colleagues have uncovered two main features of the brain circuits that impact this crucial balance."

"The researchers found that spikes in the patterns of electrical pulses in the form of high-frequency bursts combined with the filtering properties of synapses are crucial to the regulation of the amyloid-beta 40/42 ratio. Synapses that transfer information in spike bursts improve the amyloid-beta 40/42 ratio. This research represents a major advance in understanding how brain circuits regulate the composition of amyloid-beta proteins."

"According to Dr. Slutsky, different kinds of environmental changes—as well as sensory and emotional experience—can modify the properties of synapses and change the spiking patterns in the brain." - Brain Bursts improve Learning and Memory, Christopher Bergland, *Psychology Today* (April 2013)

Gamma Brainwaves and Consciousness

"The suggested mechanism is that gamma waves relate to neural consciousness via the mechanism for conscious attention" *Gamma Wave, Wikipedia*

"Thus the claim is that when all these neuronal clusters oscillate together during these transient periods of synchronized firing, they help bring up memories and associations from the visual precept to other notions. This brings a distributed matrix of cognitive processes together to generate a coherent, concerted cognitive act, such as perception. This has led to theories that gamma waves are associated with solving the binding problem." *Gamma Wave, Wikipedia*

Gamma Brainwaves and Inspiration

"Behold the proverbial Aha! Moment—a key phenomenon that emerges in a range of situations, from offering a solution to a problem or a new interpretation of a situation to more simple feats such as understanding a joke or solving a crossword puzzle... In the volunteers that experienced insight, Kounios and Beeman found a distinctive spark of high gamma activity that would spike one-third of a second before volunteers consciously arrived at an answer."

The Aha! Moment: The Science Behind Creative Insight, November 11, 2017 Lauren Migliore, Brain World Magazine (June 2012)



Attentiveness Training (AT)

Gamma Brainwaves and Memory

"Thus, we set out to test whether access to LTM [Long Term Memory] modulates human gamma responses. We investigated whether simple visual stimuli evoke more gamma activity when subjects already have a memory representation of the presented objects as compared to when they perceive novel visual stimuli which do not match LTM. Indeed, stimuli for which subjects already had a representation in their LTM evoked significantly larger gamma responses."

Memory-matches evoke human gamma-responses

Christoph S Herrmann *Email author*, Daniel Lenz, Stefanie Junge, Niko A Busch and Burkhard Maess
BMC Neuroscience 20045:13, 13 April 2004

"While patients performed the memory game, scientists observed electrical activity in their brains to determine whether specific brain waves were associated with successfully storing and retrieving memories. Researchers found that a fast brain wave, known as the gamma rhythm, increased when participants studied a word that they would later recall. The same gamma waves, whose voltage rises and fall between 50 and 100 times per second, also increased in the half-second prior to participants correctly recalling an item."

Brain Waves That Distinguish False Memories From Real Ones Pinpointed, October 24, 2007, University of Pennsylvania, Science Daily (Oct 2007)

Gamma Brainwaves and Recognition

"Neural mechanisms of object recognition seem to rely on activity of distributed neural assemblies coordinated by synchronous firing in the gamma-band range (>20 Hz). In the present electroencephalogram (EEG) study, we investigated induced gamma band activity during the naming of line drawings of upright objects and objects rotated in the image plane. Such plane-rotation paradigms elicit view-dependent processing, leading to delays in recognition of disoriented objects. Our behavioral results showed reaction time delays for rotated, as opposed to upright, images. These delays were accompanied by delays in the peak latency of induced gamma band responses (GBRs), in the absence of any effects on other measures of EEG activity. The latency of the induced GBRs has thus, for the first time, been selectively modulated by an experimental manipulation that delayed recognition. This finding indicates that induced GBRs have a genuine role as neural markers of late representational processes during object recognition. In concordance with the view that object recognition is achieved through dynamic learning processes, we propose that induced gamma band activity could be one of the possible cortical markers of such dynamic object coding."

Induced Gamma Band Responses Predict Recognition Delays during Object Identification, Jasna Martinovic, Matthias M. Müller, Thomas Gruber, Journal of Cognitive Neuroscience, Volume 19 Issue 6, June 2007, Pages 921-934

Gamma Brainwaves and ADHD

"Children with AD/HD had elevated levels of absolute delta and theta power, and decreased levels of absolute beta and gamma power, compared to controls. With relative power measures, children with AD/HD showed enhanced delta and theta activity, with reduced alpha, beta and gamma activity. Inattention scores on the Conners' Parent Rating Scale were negatively correlated with absolute gamma."

Resting-state EEG gamma activity in children with Attention-Deficit/Hyperactivity Disorder Robert J. Barr, Clinical Neurophysiology, Volume 121, Issue 11, November 2010, Pages 1871



Attentiveness Training (AT)

Gamma Brainwaves and Schizophrenia

"Media Lab Professor Edward S. Boyden is developing technology to assess the role of coordinated neural activity in cognitive deficits in schizophrenia. The technology will be used to determine whether gamma-synchronized neural activity is necessary for proper behavioral function, and to determine if amplified oscillations can remedy disordered perceptual and cognitive processing typically found in individuals with schizophrenia."

Altered brain activity in schizophrenia may cause exaggerated focus on self, Study links schizophrenia to key 'default mode' in brain, Cathryn M. Delude, McGovern Institute January 19, 2009; MIT News (Jan 2009)

Gamma Brainwaves and Autism

"What we've observed is that starting as young as 6 months, maybe even younger, infants who have a high risk for developing autism show dramatic reductions in gamma activity," Nelson says."

"Gamma waves are also known to help establish the proper balance of excitation and inhibition in the brain, disruptions in which have been linked to autism."

Nature. 2009 Jun 4;459(7247):663-7. doi: 10.1038/nature08002.

Driving fast-spiking cells induces gamma rhythm and controls sensory responses.

Cardin JA1, Carlén M, Meletis K, Knoblich U, Zhang F, Deisseroth K, Tsai LH, Moore CI.

Nature. 2009 Jun 4;459(7247):698-702. doi: 10.1038/nature07991. Epub 2009 Apr 26.

Parvalbumin neurons and gamma rhythms enhance cortical circuit performance.

Sohal VS, Zhang F, Yizhar O, Deisseroth K.

More on Gamma Brainwaves

"Enhancing Nav1.1 activity, and consequently improving PV cell function, may help in the treatment of Alzheimer's disease and other neurological disorders associated with gamma-wave alterations and cognitive impairments such as epilepsy, autism and schizophrenia," said Dr. Palop, who is also an assistant professor of neurology at the University of California, San Francisco, with which Gladstone is affiliated. "These findings may allow us to develop therapies to help patients with these devastating diseases." "

Mechanism May Aid Treatment For Alzheimer's And Neurological Disorders Associated With Gamma-Wave Alterations And Cognitive Impairments, Medical News Today (April 2012)

"In the first few runs, while the rats were still learning the maze, the researchers saw bursts of ventral striatum activity in the gamma frequency range shortly before the rats finished the maze... When the rats began to catch on to how to earn the reward, the gamma activity faded away and was replaced with short bursts of activity in the beta band, a lower frequency, just after they finished the maze."

Brain rhythms are key to learning, New study from MIT neuroscientists finds that brain waves shift frequency as a new task becomes routine. Anne Trafton, MIT News, September 27, 2011



Attentiveness Training (AT)

"MIT neuroscientists found that neurons in the prefrontal cortex — the brain's planning center — fire in unison and send signals to the visual cortex to do the same, generating high-frequency waves that oscillate between these distant brain regions like a vibrating spring. These waves, also known as gamma oscillations, have long been associated with cognitive states like attention, learning, and consciousness."

Long-distance Brain Waves Focus Attention, June 2, 2009; McGovern Institute for Brain Research, Science Daily (June 2009)

"These waves, also known as gamma oscillations, have long been associated with cognitive states such as attention, learning and consciousness."

Long-distance brain waves focus attention, McGovern study finds; Cathryn M. Delude, McGovern Institute, May 28, 2009; MIT News (May 2009)

"Researchers at the University of Wisconsin-Madison have found that during meditation, Zen Buddhist monks show an extraordinary synchronization of brain waves known as gamma synchrony—a pattern increasingly associated with robust brain function and the synthesis of activity that we call the mind."

Zen Gamma by David Dobbs, Scientific American (March 2005)

"Those transformed states have traditionally been understood in transcendent terms, as something outside the world of physical measurement and objective evaluation. But over the past few years, researchers at the University of Wisconsin working with Tibetan monks have been able to translate those mental experiences into the scientific language of high-frequency gamma waves and brain synchrony, or coordination. And they have pinpointed the left prefrontal cortex, an area just behind the left forehead, as the place where brain activity associated with meditation is especially intense."

Meditation Gives Brain a Charge, Study Finds; By Marc Kaufman, The Washington Post, January 3, 2005; Page A05

"Long-term meditators self-induce high-amplitude gamma synchrony during mental practice."

Long-term meditators self-induce high-amplitude gamma synchrony during mental practice; Antoine Lutz, Lawrence L. Greischar, Nancy B. Rawlings, Matthieu Ricard and Richard J. Davidson PNAS 2004 November, 101 (46) 16369-16373.

"Functional imaging of human cortex implicates a diverse network of brain regions supporting working memory — the capacity to hold and manipulate information for short periods of time. Although we are beginning to map out the brain networks supporting working memory, little is known about its physiological basis. We analyzed intracranial recordings from two epileptic patients as they performed a working memory task. Spectral analyses revealed that, in both patients, gamma (30–60 Hz) oscillations increased approximately linearly with memory load, tracking closely with memory load over the course of the trial. This constitutes the first evidence that gamma oscillations, widely implicated in perceptual processes, support the maintenance of multiple items in working memory."

Gamma Oscillations Correlate with Working Memory Load in Humans

Marc W. Howard Daniel S. Rizzuto Jeremy B. Caplan Joseph R. Madsen John Lisman Richard Aschenbrenner-Scheibe Andreas Schulze-Bonhage Michael J. Kahana Cerebral Cortex, Volume 13, Issue 12, 1 December 2003, Pages 1369–1374